REMARKS/ARGUMENTS

In response to the Office Action mailed September 21, 2005, Applicants request reconsideration. No claims are added, cancelled, or even amended so that claims 1-3 remain pending.

As recognized in the Office Action, the invention concerns a control apparatus for a three-phase rotating machine, such an induction motor or a synchronous motor. Claim 1 is the sole independent claim and describes that control apparatus as including an integrator that integrates a primary angular frequency and computes phase. A power converting unit applies a three-phase voltage to the rotating machine in accordance with a three-phase voltage command. A current detecting unit detects currents flowing in phases of the rotating machine. An important element of the control unit is coordinate converting unit that performs two different functions. The coordinate unit converts coordinates of the three-phase current that is detected into current components on rotating two-axis coordinates, employing the phase computed by the integration unit. As well known to those of skill in the art, the two-phase coordinate system referred to and explained in detail in the patent application generally is designated as having q and d coordinates whereas the three-phase coordinate system is usually described as having components along three axes, u, v, and w. The coordinate converting unit also converts a voltage command on the two axis coordinates into the three-phase voltage command used to control the rotation of the rotating machine. As well known to those of skill in the art, the important characteristic of any control apparatus for a rotating machine is the ability to "follow" changes in loads and currents so that the output of the rotating machine is nearly unvarying in spite of variations of the loads and currents.

A particularly important feature of the invention is described in the final paragraph of claim 1. The voltage command computing unit of the control apparatus according to the invention computes the voltage command on the rotating two-axis coordinates, using the primary angular frequency that is employed by the coordinate converting unit in controlling the rotating machine. The two-axis voltage command is calculated not only based upon the primary angular frequency but also on deviations in absolute values of the current components along each axis of the rotating two-axis coordinates. As explained in

the patent application, by employing these absolute values along each of the axes of the two-axis coordinate system, a highly desirable control characteristic of the rotating machine is achieved. The control system can maintain a constant current transient response irrespective of changes in the load torque or operating point. Further, the current amplitude can be maintained within a desired range even if the rotation speed of the controlled machine changes suddenly, for example by application of an impact load.

Claim 1 was rejected as unpatentable over Negoro (U.S. Patent 6,335,605) in view of Tajima et al. (U.S. Patent 5,880,572, hereinafter Tajima). This rejection is respectfully traversed.

In making the rejection, the Examiner relied upon the motor control system illustrated in Figure 1 of Negoro. According to the Office Action, the control apparatus illustrated in that figure meets every limitation of claim 1 with the exception of the voltage command computing unit. Tajima was relied upon as describing a voltage command computing unit as in the final paragraph of claim 1 and, for an assertion, unsupported, that one of skill in the art would have modified the Negoro apparatus with the portion of Tajima relied upon in the rejection.

There are two fundamental requirements to establish *prima facie* obviousness. First, all of the elements of the claimed invention must be shown to be present in the prior art. The second requirement is that, even if all of the elements of claim are shown to be present in the prior art, there must be motivation for combining the elements as in the claimed invention. In the present situation, the first requirement is not met so that the second requirement need not, at this time, be considered.

In applying Tajima in the rejection, emphasis was placed upon Figure 3, and particularly the leakage inductance calculation circuit 22. The present invention does not require nor use calculation of leakage inductance to achieve the desired control of a rotating machine. Tajima's entire control scheme depends upon accurate calculation of that leakage inductance.

Turning to Figure 5 of Tajima and the corresponding explanation cited by the Examiner in columns 8 and 9, the first amplitude calculation circuit 31 acts on the AC signal by establishing the absolute value of that signal. Likewise, a second amplitude

calculation circuit 32 determines the absolute value of the M-axis current value. The difference between the two absolute values is determined and, after a subsequent adjustment, leakage inductance value L# is calculated. As best can be determined, this signal is subsequently applied as the M-axis control signal to the second coordinate conversion circuit 6, which generates three-phase control signals from the two-axis control signals V_T* and V_M*.

Leaving aside the absence of any analogy between the leakage inductance calculation and the two-axis voltage command that is applied in the claimed invention, as defined by claim 1, it is entirely apparent that there is no description in Tajima and no suggestion in Tajima for a voltage command computing unit, as in the invention, that employs absolute values of both of the d-axis and q-axis current components of the current in order to generate a three-phase voltage command. At best, what is described by Tajima is the use of the absolute value of only one of those current components on one of the axes of the two-axis coordinate system in determining some value that aids in calculating a three-phase voltage command. Tajima takes the absolute value of two M-axis values only and uses the results of that mathematical manipulation in generating a three-phase command. There is no description of similar treatment of any T-axis component. The invention, according to the express words of the final paragraph of claim 1, determines the absolute value of each, i.e., both, of the d and q axis current components in generating a three-phase voltage control.

Accordingly, if Negoro is modified by Tajima, as hypothesized in the rejection, the modification still lacks all of the elements of the claimed invention. Therefore, that modification cannot establish *prima facie* obviousness of claim 1. Accordingly, upon reconsideration, the rejection of claim 1 should be withdrawn.

Claims 2 and 3 were each rejected as obvious over Negoro in view of Tajima and further in view of different tertiary references. Since *prima facie* obviousness has not been established with regard to claim 1 and since each of the additional references is cited only on the basis of allegedly the limitations of the dependent claims, further comment on the rejections of claims 3 and 4 is not necessary nor provided at this time.

Reconsideration and allowance of claims 1-3 are earnestly solicited.

Respectfully submitted,

Jeffrey A. Wyand, Reg. No. 29,458
LEYDIG, VOIT & MAYER
700 Thirteenth Street, N.W., Suite 300
Washington, DC 20005-3960
(202) 737-6770 (telephone)
(202) 737-6776 (facsimile)

Date: December 15, 2005
JAW:ves

Amendment or ROA - Regular (Revised 2005 09 01)